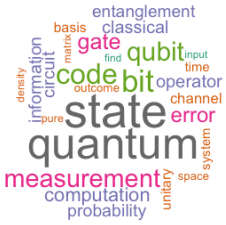

Contribution ID: **13** Type: **not specified**

Quantum Simulating Lattice Gauge Theories with Optical Lattices

Thursday, December 7, 2017 2:30 PM (1 hour)

Optical lattices have been used successfully to quantum simulate the Bose-Hubbard model.
We briefly review recent proposals to use similar procedures for lattice gauge theories.
The long term objectives are to deal with sign problems and the real time evolution,
which is not possible with classical computations.
We introduce a gauge-invariant formulation of the Abelian Higgs model in 1+1 dimensions
obtained with the tensor renormalization group method. We propose an approximate realization using
cold atoms in an optical lattice with a ladder structure. Recently developed Rydberg's atom manipulations allow to
create nearest neighbor interactions with the desired strength. An experimental proof of principle would be to try
first simpler examples: the Ising and O(2) models. We report on recent progress in this direction.

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